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Adoption of Scientific Pig Production Practices by Small Scale Pig Farmers in Assam: A Comparative Analysis

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ABSTRACT

The research work was undertaken to compare the adoption of scientific pig production practices by small scale pig farmers in Assam in the adopted villages of ICAR-National Research Centre on Pig, Guwahati and the non-adopted villages. A composite adoption index was developed for measuring the adoption level of small-scale pig farmers. The primary data was collected from 360 small scale pig farmers equally from both the groups during 2020-2021. The data was analyzed using Mann-Whitney "U" test and observed a significant difference in adoption level between both the groups. In the adopted villages, 50.56 per cent of farmers were under high adoption category followed by 48.89 per cent in medium category whereas in non-adopted villages, about 88.33 per cent of the respondents were in the low adoption category and 10.56 per cent in medium adoption category. The independent factors like education, experience in pig farming, family size, herd size, annual income, extension contact and social participation were positively correlated with adoption level. It was observed that the adoption level of scientific pig production practices by small scale pig farmers in adopted villages is significantly higher than the adoption level of non-adopted villages.

INTRODUCTION

Livestock sector contributes a major share in the source of livelihood of tribal communities residing in the North Eastern Region of India (Kumar et al., 2007; Mohakud, 2020). This sector also provides food security as well as nutritional security along with income and employment generation (Feroze et al., 2010; Chauhan et al., 2016). Even though livestock rearing is an integral part of the life of farmers in north eastern region, there exists a significant technological and adoption gap in the practices followed by them (Pourouchottamane et al., 2012). Small scale backyard pig farming is a way of life among the tribal communities of North Eastern Region of India (Feroze et al., 2010; Gills et al., 2013; Nain et al., 2013; Patr et al., 2014; Chahal et al., 2014; Singha et al., 2016; Mohakud, 2020) like other developing countries (Lanada et al., 2005). They usually rear one or two pigs in their backyard without any housing structures and feed it with natural sources (Mutua et al., 2010; Haldar et al., 2017). Unlike intensive commercial pig farming systems which require huge inputs and establishment costs, the backyard systems rely on minimum inputs (Kumaresan et al., 2009; Patr et al., 2014). However, these small scale pig production systems hold good potential to reduce poverty (Ahmed et al., 2017) as the demand for pork is substantially high in these areas (Ansari et al., 2013). The performance of pigs depends on the production practices. By following scientific way of deworming and mineral mixture supplementation the body weight of pigs can be improved significantly (Kumaresan et al., 2009).

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Several attempts were done by researchers to show the status, constraints and opportunities of pig sub-sector in NE India (Deka et al., 2007; Patr et al., 2014; Chauhan et al., 2016). Chandraker et al., (2021) conducted a study on the adoption of improved pig husbandry practices and its determinants at Jharkhand and Chhattisgarh and focussed only on entrepreneurs. Further, in a study conducted at Mizoram, the adoption of improved technologies by the pig farmers were studied and identified the determinants of adoption (Rahman, 2007). But, measurement of adoption level specifically among small scale farmers in Assam was hardly found. Assam is recognized for highest pig population in the country and a major share was contributed by the small-scale farmers running their backyard farms with very limited resources. Hence, in this background, the present study aims to assess the level of adoption of scientific pig production practices specifically by the small-scale pig farmers in Assam. The study also attempts to do a comparative analysis of the adoption level in the adopted villages of ICAR-National Research Centre on Pig and in the non-adopted villages. The hypothesis to be tested is: "A significant difference exists in the adoption level of scientific pig production practices among the farmers of adopted and non-adopted villages".

METHODOLOGY

The study was conducted in the state of Assam during 2020-2021. The ex-post facto research design was used in this study. For assessing the adoption level, six adopted villages of ICAR-National Research Centre on Pig, Guwahati i.e, Sajjanpara, Sattargaon, Batabari, Belguri, Garilik and Kumarbari were purposively selected from Kamrup District. For comparison, six non-adopted villages were selected from Kamrup (Bengalikuchi and Baghbari villages), Tamulpur (Ambari and Barkhata villages) and Goalpara (Thekasu and Nabagram villages) districts considering the same socio-cultural and socio-economic background. From each district two villages were selected. Using a semi-structured interview schedule, primary data was collected from 360 small scale pig farmers i.e., 30 farmers from each village were selected.

For measuring the adoption rate of scientific pig production practices, a composite adoption index was developed. For this, six major dimensions were selected based on the review of literature and experts' opinion. They are breeding, housing, feeding, management, health care and biosecurity. Under these dimensions, 72 scientific practices were selected as variables. Then relevancy testing was carried out and accordingly the variables were reduced to 45. The answer regarding the adoption of each scientific practice was collected in the form of yes or no question. Further, weights were assigned using principal component analysis (PCA) to the respective variables. This method was also used by Jaina et al., (2009), Kale et al., (2016) & Sendhil et al., (2018). The principal components with Eigen value > 1 were used following the Kaiser criterion.

Then, by using the weights for each variable, a composite index value was calculated with the following formula:

$$\text{Index} = \frac{\sum_{i=1}^{n} X_i W_i}{\sum_{i=1}^{j} W_i}$$

Where, X_i = The normalized value of i^{th} indicator; W_i = The weight of the i^{th} indicator

Finally, the farmers were categorised into low, medium and high adopter categories using cumulative square root frequency method. Further, Mann Whitney "U" Statistics was used to compare the means of two independent samples viz. adopted villages and non-adopted villages. The correlation analysis was done using spearman's rank correlation coefficient in SPSS software. The hypothesis testing was done using T-test. It tested the assumption that correlation coefficient of sample data can be generalized to the population. Based on the p-value obtained, the significance was noted.

RESULTS AND DISCUSSION

Adoption of scientific pig production practices

An adoption index was developed with six major dimensions and forty-five variables based on the weights assigned through PCA as shown in Table 1. The difference in adoption level of scientific pig production practices in the adopted villages of ICAR-National Research Centre on Pig and Non-adopted villages was measured using this index.

Based on the adoption index score obtained for each farmer, three categories of adoption level were formed by Cumulative Square Root Frequency Method. The distribution of respondents from adopted and non-adopted villages in different categories of adoption level were observed. In the adopted villages, about half of the farmers (50.56%) were under high adoption level category followed by 48.89 per cent farmers in medium adoption category. Only 0.56 per cent of the respondents belonged to low adoption category. Differently, in non-adopted villages, low adoption level was found among majority (88.33%) of the respondents followed by medium (10.56%) and high (1.11%) categories.

The Mann-Whitney "U" Test was used here for assessing the difference between adopted and non-adopted villages. The results revealed (Table 2) that the mean adoption index by the farmers of adopted villages and farmers of non-adopted villages were 0.51 ± 0.01 and 0.13 ± 0.01 respectively. A significant difference ($p < 0.01$) was found in overall adoption of scientific pig production practices among the small-scale pig farmers in adopted villages from non-adopted villages. Similar finding was revealed by Garai et al., (2017) regarding the adoption of scientific dairy farming practices after extension interventions. The data portrayed in Table 2 evidently showed that the mean scores of adoption of breeding, housing, feeding, management, health care and biosecurity were significantly higher in the adopted villages compared to non-adopted villages.

Effect of independent variables on adoption

It was observed that (Table 3) the adoption of scientific pig production practices in the adopted villages after conducting the extension activities were significantly and positively correlated with the education, experience in pig farming, family size, herd size, annual income, extension contact and social participation. Among these, except family size and social participation, all were significant at 0.01 level of significance.

The table revealed that the age and land holding size were not significantly correlated with the adoption. The similar nonsignificant

Table 1. Weight assigned to different variables in adoption index

S.No.	Variables	Weights assigned by PCA
I	Breeding	
1	Avoid the first heat after farrowing for breeding	10.97
2	Avoid mating young gilts on the first and second heats	10.81
3	Purchase of new pigs only from credible source with pedigree records	9.38
4	Avoid mating of close relatives	9.25
5	Keep pedigree record	7.75
6	Separate housing for male and female growers	7.64
II	Management	
7	Farrowing areas should be well bedded, clean and disinfected	11.29
8	Pregnant sow should be housed and fed separately after 70 days of gestation	11.19
9	Provision of shades and wallows for pregnant animals	11.12
10	Proper record keeping of farm operations	8.94
11	Practice of AI using semen from a credible source	8.07
12	Remove the needle teeth of piglets as soon as possible after birth	7.92
13	Manual/foster mother feeding practices for orphan piglets	7.16
14	Ear tagging at 1-3 days of life for identification of individual animal	7.07
15	Farm animals should have insurance coverage	6.53
16	Integrated farming with horticulture crops, fish, etc.	6.20
17	Male piglets for meat purpose should be castrated at very young age (2-3 weeks)	6.01
18	Weaning of piglets once they start taking adequate quantity of solid feed	5.92
III	Feeding	
19	Preservation of feed materials while in abundancy (Silage making)	10.75
20	Creep feeding of piglets from two weeks of age	8.86
21	Practice flushing (Giving extra feed to sows and gilts from 1-2 weeks prior breeding and return to normal feeding after breeding)	8.49
22	Feeding of mineral mixture	6.77
23	Provide balanced ration (carbohydrates, protein, vitamins and minerals)	6.61
24	Adjust the feed quantity according to the breed, body weight and growing stage	5.16
25	Use of unconventional feed resources to minimize the cost	3.97
IV	Housing	
26	Provide fresh air through cross ventilation	12.71
27	Proper drainage facility with slope on the floor	11.93
28	Raise the floor above ground level to prevent reptiles, rats etc	11.93
29	Floor should be free from dampness and it should be non-slippery	11.90
30	Separate room for pregnant animals, boars and lactating mothers	10.37
31	Ample space for the exercise to the animals	9.76
32	Provision of heat/cold stress management facilities in the pig shed	8.57
33	Provision of minimum distance from farmers house	3.87
V	Health care	
34	Iron injection for piglets on 4^{th} and 14^{th} day after birth	12.70
35	Vaccination against diseases as per the recommended vaccination schedule	8.77
36	Spraying of medicines against tick and lice regularly	8.36
37	Isolation of diseased animals	7.28
38	Practice of deworming on regular intervals	7.26
39	Consultation with veterinary officers for proper investigation and treatment of the diseases	7.02
VI	Biosecurity	
40	Regular disinfection of farm and premises using disinfectants	12.08
41	Regular cleaning of pig sites and pigs	9.95
42	Proper disposal or utilization of dung, urine and feed wastes	8.51
43	Use of gum boots and separate farm dress	8.00
44	Report diseases or unusual mortalities to the government authorities	6.46
45	Proper cleaning of hand after working in pig farm	3.83

Table 2. Difference in adoption of scientific pig production practices between adopted and non-adopted villages

Dimensions of Adoption index	Adopted villages (n=180) (Mean ± SE)	Non-adopted villages (n=180) (Mean ± SE)	Mann Whitney U Statistics	
			U Statistics	p value
Breeding	0.38 ± 0.02	0.02 ± 0.01	29002	0.0001
Housing	0.63 ± 0.02	0.10 ± 0.01	31143.5	0.0001
Feeding	0.46 ± 0.02	0.16 ± 0.00	29819	0.0001
Management	0.32 ± 0.02	0.06 ± 0.00	30413	0.0001
Health care	0.77 ± 0.02	0.33 ± 0.01	29904	0.0001
Biosecurity	0.65 ± 0.01	0.21 ± 0.01	30567	0.0001
Overall adoption	0.51 ± 0.01	0.13 ± 0.01	31849	0.0001

Table 3. Correlation analysis between different variables and adoption index score

S.No.	Independent variables	'r_s' value
1	Age	0.084NS
2	Education	0.361**
3	Experience in pig farming	0.532**
4	Family Size	0.192*
5	Land holding	0.053NS
6	Herd size	0.433**
7	Annual Income	0.298**
8	Extension contact	0.414**
9	Social Participation	0.226*

*Significant at 0.05 level of significance; **Significant at 0.01 level of significance; r_s= Spearman's rank correlation coefficient

correlation between age and adoption of dairy practices was reported by Gautam et al., (2007). In contrary, Rahman (2007) reported negative and significant correlation between age and adoption of improved technologies by the pig farmers of Mizoram. Farmers with higher education and more experience in pig farming, are better aware about the advantages of scientific pig production practices and hence might have adopted them largely. Regarding the family size, non-significant correlation with adoption of new dairy practices was reported by Gautam et al., (2007). With higher annual income, the farmers will be able to purchase the necessary inputs for piggery. Higher income earned by farmers might help them in adopting scientific health care and bio security practices for the pigs and they will be more enthusiastic to adopt new technologies. Similar finding was reported by Pabba et al., (2022) with regards to the adoption of climate resilient agricultural technologies. The better social participation and extension contact might have helped the farmers to fetch more information about the scientific practices and its advantages followed by greater adoption. The positive and significant correlation of extension contact and adoption rate of a technology was also reported by Singh et al., (2021).

CONCLUSION

The adoption index prepared can be used for assessing the adoption of scientific pig production practices by small scale pig farmers in future studies. The highly significant adoption level in the adopted villages compared to non-adopted villages shows the positive effects of extension activities carried out by the ICAR-National Research Centre on Pig. The positive correlation between the independent variables like education, experience in pig farming, family size, herd size, annual income, extension contact and social participation with the dependent variable adoption delineate the determinants to be focussed on in the planning of future extension activities. This study can pave way for planning need based training programs for the small scale pig farmers.

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